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(54) Abstract Title  
**Transaction system**

(57) A transaction system (10) for use by a disabled person comprises a self-service terminal (12) such as an ATM, a portable terminal (14) such as a PDA, and an assistive technology device (16) to augment the communication of the disabled person. The assistive technology device (16) has a user interface that is customised for the user's disability, and is operable to transfer transactions to the portable terminal (14) for execution at the self-service terminal (12).

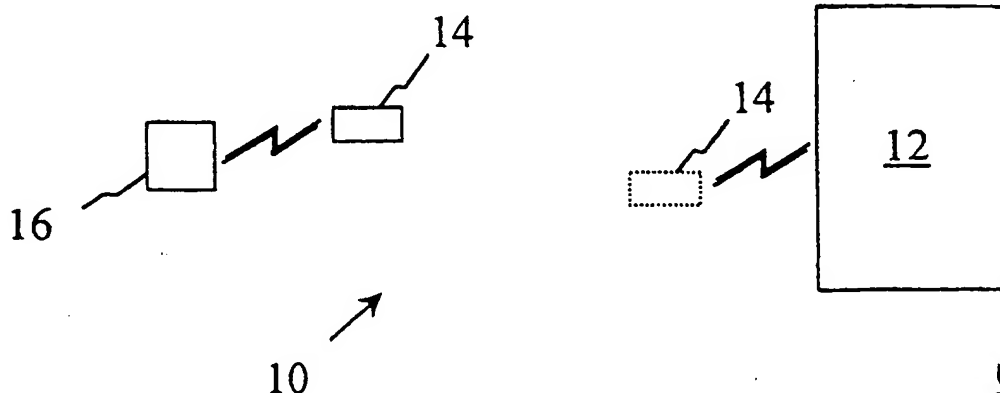


Fig 1

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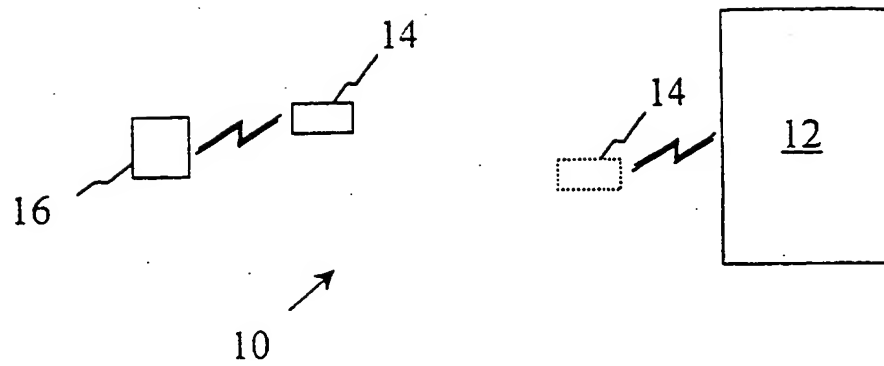


Fig 1

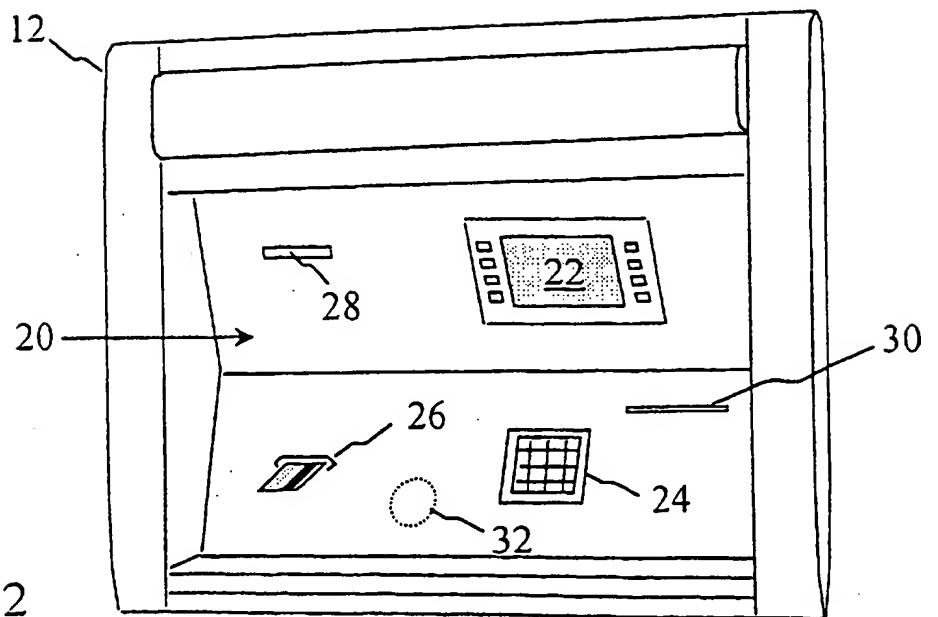


Fig 2

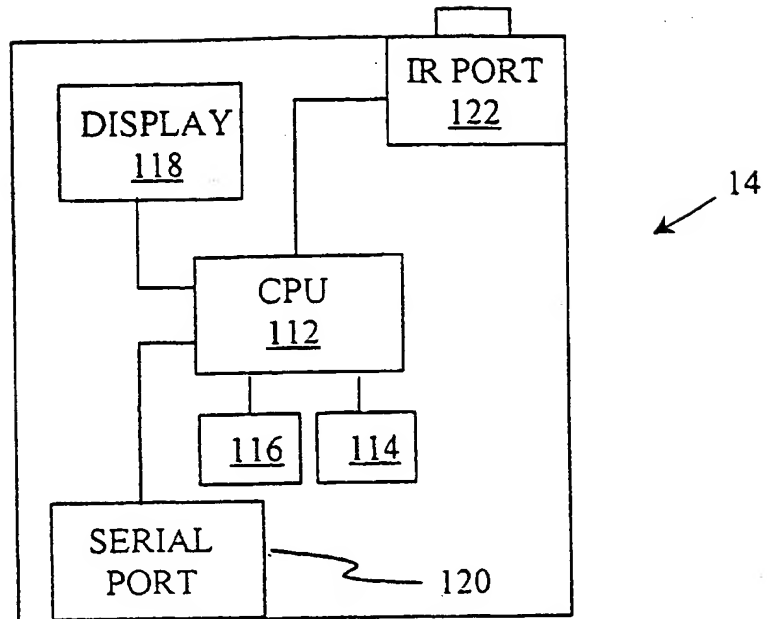


Fig 3

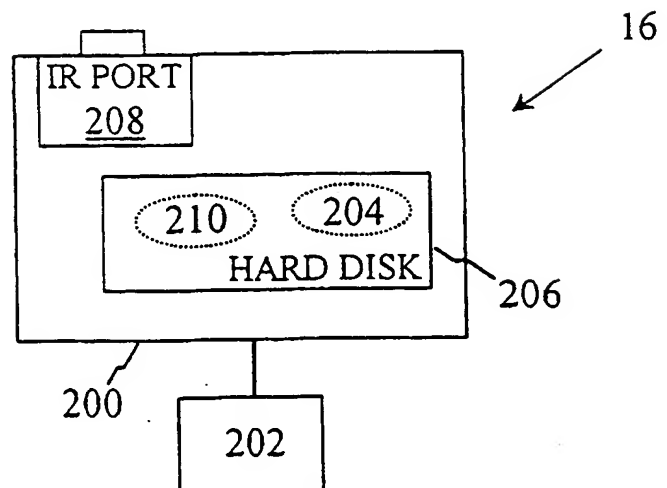


Fig 4

## TRANSACTION SYSTEM

The present invention relates to a transaction system. In particular, the invention relates to a transaction system including a self-service terminal (SST), such as an automated teller machine (ATM) or a financial services centre (FSC).

Conventional SSTs, such as ATMs, provide a user interface that includes a keypad and a display screen. The screen is used to display transaction information and to prompt the user to make selections by depressing one or more keys on the keypad. This type of user interface is satisfactory for most users of ATMs. However, users with disabilities may have difficulty using the keypad or seeing the information displayed on the screen.

It is possible to design an ATM for use by a user with a particular disability. However, it is very expensive to design an ATM that is suitable for use by users who may have one or more of a variety of different disabilities. For example, an ATM that has a large screen area and that uses large icons may be suitable for a partially-sighted person but is not suitable for a completely blind person. Similarly, an ATM that receives voice commands and provides speech prompts instead of (or in addition to) visual prompts may be suitable for a blind or partially-sighted person, but is not suitable for a person who is blind and deaf.

Even if an ATM is designed to cater for every possible disability, some users may be reluctant to use the ATM because it may highlight their disability, thereby making them self-conscious about using the ATM. Using certain user interface elements of such an ATM may also reduce the privacy of a transaction, for example, if voice commands are used a third party may overhear the transaction. Use of some types of user interface elements may also alert third parties to the user having a disability and thereby give rise to opportunist crime, for example, a third party

stealing cash as it is being withdrawn from an ATM by a partially-sighted user.

It is an object of an embodiment of the invention to obviate or mitigate one or more of the above disadvantages.

It is a another object of an embodiment of the invention to provide a transaction system that is suitable for use by people having one or more of a variety of different disabilities without third parties being able to determine the disability of the user from the transaction format or the user interface of the SST.

According to a first aspect of the invention there is provided a transaction system for use by a disabled person characterised in that the system comprises a self-service terminal, a portable terminal, and an assistive technology device; where the assistive technology device allows a user to prepare a transaction using an interface not conventionally available at a self-service terminal, and the assistive technology device is operable to transfer transactions to the portable terminal for execution at the self-service terminal.

It will be understood that the term 'assistive technology device' is used herein to indicate a device that is specifically designed or adapted for use by a person having a disability. An assistive technology device may be used to augment the ability of a disabled person to communicate.

By virtue of this aspect of the invention a disabled person is able to prepare a transaction in the security of his/her home using technology that is specifically adapted for his/her disability; this means that the disabled person does not need to use the user interface provided by an SST for entering a transaction. This also has the advantage of reducing the transaction time at the SST, and thereby reducing the risk of opportunist crime by a third party observing the transaction.

The assistive technology device may be for use by a blind or partially-sighted person. For example, the assistive technology device may be a voice dictation system for converting speech to text. The voice dictation system may be trained for a particular disabled person having poor quality of speech so that the voice dictation system can accurately recognise the person's commands; whereas an untrained voice dictation system, such as may be used on an ATM, may not be able to recognise accurately the person's speech. The assistive technology device may be mouth operated, such as a mouth-operated keyboard. The assistive technology device may be a Braille keyboard.

The portable terminal may be a personal digital assistant (PDA), a Smart card, or such like.

The user may interact with the assistive technology device in a manner different to conventional interaction with an SST or a PDA. Additionally or alternatively, the user may interact with the assistive technology device using instructions not available at a conventional SST. The assistive technology device may be trained for the particular user, for example, if speech recognition is used, then the assistive technology device may be trained for the user's voice and/or vocabulary.

The portable terminal may be incorporated in a device normally used by the disabled person to assist movement or communication, for example, a wheelchair, a walking stick, a hearing aid, or such like device.

According to a second aspect of the invention there is provided a self-service terminal for use by users having one or more of a variety of different disabilities, the terminal being characterised by a port for receiving a transmission from a portable terminal for interfacing with an assistive technology device.

Preferably, the self-service terminal is further characterised by providing an audible and visual indication on completion of each transaction to alert the user that any

cash presented by the self-service terminal should be removed by the user. The combination of an audible and visual indication should alert the user to the fact that the transaction has been completed, regardless of whether the user is deaf or blind. This has the advantage that the SST does not disclose to any third party the nature of the user's disability.

The port may receive the portable terminal, so that the portable terminal is coupled to the port.

According to a third aspect of the invention there is provided a method of executing a transaction at a self-service terminal, characterised in that the method comprises the steps of: using an assistive technology device to prepare a transaction; transferring the prepared transaction to a portable terminal; conveying the portable terminal to a self-service terminal; and executing the prepared transaction at the self-service terminal.

According to a fourth aspect of the invention there is provided a portable terminal characterised in that the portable terminal is adapted to interface with an assistive technology device and with a self-service terminal, where the assistive technology device has an interface customised for a particular disability, so that, in use, a user may prepare a transaction using the assistive technology device, transfer the transaction to the self-service terminal using the portable terminal, and execute the prepared transaction at the self-service terminal.

Preferably, the portable terminal is adapted for two-way communication with the assistive technology device and with the self-service terminal. This has the advantage that the user can review any messages from the SST, such as a bank statement or a receipt, using the assistive technology device.

According to a fifth aspect of the invention there is provided an assistive technology device, characterised in that the device has a transaction interface for allowing a

user to prepare a transaction for transferring to a portable terminal and for executing at an SST.

These and other aspects of the invention will be apparent from the following specific description, given by way of example, with reference to the accompanying drawings, in which:

Fig 1 is a block diagram of a transaction system according to one embodiment of the present invention;

Fig 2 is schematic view of the fascia of the self-service terminal shown in Fig 1;

Fig 3 is a block diagram of the portable terminal shown in Fig 1; and

Fig 4 is a block diagram of the assistive technology device shown in Fig 1.

Referring to Fig 1, there is shown a transaction system according to one embodiment of the present invention. The system 10 has a publicly-accessible self-service terminal 12 in the form of an ATM, a portable terminal 14 in the form of a personal digital assistant (PDA), and an assistive technology device 16 in the form of a personal computer (PC) having customised hardware and software installed thereon. The PDA 14 is operable to communicate with the PC 16 and, at a subsequent time, with the ATM 12, as will be described further below. This is illustrated in Fig 1 by PDA 14 being shown in unbroken line communicating with PC 16, and PDA 14 being shown in broken line communicating with ATM 12 at a later time.

Referring to Fig 2, the ATM 12 has a user interface 20 comprising a display screen 22, an encrypting keypad 24, a card receiving slot 26, a receipt dispensing slot 28, and a cash dispensing slot 30; these features are generally found on conventional ATMs. ATM 12 further comprises a communication port 32, in the form of an infra-red port, for interfacing with the PDA 14. The IR port may be an IR to electrical signal converter.



Referring to Fig 3, PDA 14 comprises a controller 112 and associated volatile memory 114 and non-volatile memory 116, a touch-sensitive display 118, a serial communication port 120 for receiving a connector, and a communication port 122 in the form of an IrDA (Infra-red data association) compliant infra-red port.

The PDA 14 is a standard 3-Com (trade mark) Palm IIIx (trade mark) PDA. Controller 112 is responsible for the operation of the PDA 14, and is coupled to the display 118, serial port 120, and IR port 122.

Referring to Fig 4, the personal computer (PC) 16 incorporates a PC core 200 physically and electrically coupled to speech control hardware 202. The PC 16 also has a software module 204 (shown by a broken line) installed in a storage device 206 within the PC core 200 so that the PC 16 is adapted for a particular blind user. The PC core 200 has conventional features of a PC that are not shown in Fig 4 for clarity, for example, a CPU, BIOS, memory, controllers, motherboard, and such like features. The PC 16 also has an IrDA (Infra-red data association) compliant infra-red port 208 coupled to the PC core 200. The IR port 208 is used for interfacing with IR port 122 in the PDA 14.

The speech control hardware 202 provides a microphone for receiving speech commands and a loudspeaker for conveying speech messages to the blind user. The software module 204 is provided to verify each spoken command received from the blind user by providing an audible reply. Thus, using the hardware 202 and software 204 enables a blind person to speak commands into the computer 16 and to verify that the computer 16 has correctly interpreted the spoken commands. The PC 16 thereby provides the user with an interface customised to his/her particular needs.

In addition, the PC core has ATM software 210 installed on its storage device 206 to provide the blind user with an interface for preparing ATM transactions. There are two components to the ATM software 210. The first component is

a user interface component that presents the user with an interface for preparing an ATM transaction. The second component is an encryption/decryption facility for encrypting a PIN (personal identification number) input by the user.

When an ATM function is selected by the user of the PC 16, the user interface component of the ATM software 210 provides the user with a custom ATM interface, which in this embodiment is a speech-based interface. It will be appreciated that the type of user interface presented will depend on the particular disability of the user.

The user prepares a transaction using this speech-based user interface. The user is familiar with this type of interface because it is the same type of interface that the user employs to operate the PC 16.

Initially, the user interface software 210 welcomes the user to the ATM transaction interface using the loudspeaker (not shown) and invites the user to enter his/her PIN using the microphone (not shown). Once the user has entered the PIN, the PIN is encrypted using the encryption/decryption facility (the second component of the ATM software 210) and stored. The user is then offered several different transactions and asked to select one of these transactions.

Once the user has selected one of these transactions, and entered details of the transaction where necessary, for example, if the 'withdraw cash' option is selected the user would state the amount of cash to be withdrawn, the PC 16 then uses the encryption facility to encrypt the completed transaction. The encrypted transaction is then stored.

Once the transaction has been completed, the user may transfer the prepared transaction to the PDA 14 by aligning the IR port 208 in the PC 16 with the IR port 122 in the PDA 14 and selecting the standard transfer option provided with the PDA 14. The PDA 14 stores the transferred transaction in non-volatile memory 116 until the transaction is executed at an ATM. Once the transaction is stored in the non-

volatile memory 116 of the PDA 14, the PDA 14 generates an 'Execute Transaction' option to allow the user to execute the stored transaction. This option may be selected using a button on the PDA 14, or by a speech command.

The user may convey the PDA 14 to the ATM 12, or the user may ask a trusted third party, such as a relative or friend, to convey the PDA to the ATM 12. Once at the ATM 12, the user (or the trusted third party) executes the transaction by transferring the prepared transaction from the PDA 14 to the ATM 12 via the IR port 122 and the IR converter 30. The user aligns the IR port 122 with IR converter 30 and selects the 'Execute transaction' option. When the controller 112 detects that the 'Execute transaction' option has been selected, it uses IR port 122 to transmit the encrypted completed transaction stored in memory 116 to the ATM 12. The encrypted transaction may be transmitted using a standard protocol.

When the ATM 12 executes the transaction, it generates an audible sound and a visual indication to provide the user with audible and visual indications that the transaction has been executed and that any cash staged and presented by the ATM 12 should be removed by the user.

The ATM 12 may also transfer data to the PDA 14, such as receipt information, transaction details, and such like. The user may then transfer this data to the PC 16 so that the user can review this data using the customised user interface provided by the PC 16. Thus, the PC 16 is able to augment the user's two-way communication with the ATM 12.

Various modifications may be made to the above described embodiment within the scope of the present invention. For example, the portable terminal may be a Smart card or other portable device; the portable device may not have a display. In other embodiments, the assistive technology device may not be PC-based, but may be a customised telephone, or some other suitable device. In other embodiments, the ATM may not have a user interface

except for the IR port 30. The above example relates to a single transaction. However, multiple transactions may be prepared and executed individually; or the multiple transactions may be coupled together to form one large transaction.

The ATM software 210 may allow for logical decisions to be included in the prepared transaction. For example, a balance request may be entered and if there is more than a first amount of money in the account (such as fifty pounds sterling) then a withdrawal of a second amount (such as thirty pounds) may be made; if there is not more than the first amount but there is more than a third amount (such as twenty pounds) then a withdrawal of a fourth amount (such as ten pounds) may be made; otherwise no withdrawal may be made. This allows the transaction flow to be dependent on certain conditions, such as the current state of the user's account. Other possible transactions include transfer of funds based on the amount of funds in a certain account.

In other embodiments, the ATM 12 may include a cradle so that a user may place the PDA 14 into the cradle. This would provide physical and electrical coupling between the ATM 12 and the PDA 14. When a PDA 14 is coupled to the cradle, the ATM 12 may interrogate the PDA 14 to identify any transactions that are awaiting execution. One advantage of this arrangement is that the user does not need to select the 'Execute Transaction' option, as the transaction is automatically selected by the ATM 12, all the user has to do is locate the cradle and insert the PDA therein. The cradle may use an optical connection to the PDA 14 instead of or in addition to an electrical connection.

It will be appreciated that the present invention allows a disabled user to prepare a transaction using apparatus that is customised for his/her particular use and ability, and to convey this transaction to an SST for immediate execution. This preserves the dignity of the user by ensuring that the user interface presented by the SST is

not a barrier to the user performing a transaction. It also minimises the amount of time the user must spend at the SST to perform a transaction. The SST does not differentiate between disabled and non-disabled users, each user is provided with the same level of security and safety in conducting transactions at the SST.

Claims

1. A transaction system (10) for use by a disabled person characterised in that the system (10) comprises a self-service terminal (12), a portable terminal (14), and an assistive technology device (16); where the assistive technology device (16) allows a user to prepare a transaction using an interface not conventionally available at a self-service terminal, and the assistive technology device (16) is operable to transfer transactions to the portable terminal (14) for execution at the self-service terminal (12).
2. A system according to claim 1, wherein the assistive technology device (16) is a voice dictation system for converting speech to text.
3. A system according to claim 1, wherein the assistive technology device is mouth operated.
4. A system according to any preceding claim, wherein the portable terminal (14) is a personal digital assistant (PDA).
5. A system according to any preceding claim, wherein the portable terminal (14) is incorporated in a device normally used by a disabled person.
6. A self-service terminal (12) for use by users having one or more of a variety of different disabilities, the terminal (12) being characterised by a port (30) for receiving a transmission from a portable terminal for interfacing with an assistive technology device (16).
7. A terminal according to claim 6, wherein, the terminal provides an audible and visual indication on completion of each transaction to alert the user that any cash presented by the self-service terminal should be removed by the user.

8. A terminal according to claim 6 or 7, wherein the terminal includes a cradle for receiving a portable terminal (14).

9. A method of executing a transaction at a self-service terminal, characterised in that the method comprises the steps of: using an assistive technology device to prepare a transaction; transferring the prepared transaction to a portable terminal; conveying the portable terminal to a self-service terminal; and executing the prepared transaction at the self-service terminal.

10. A portable terminal (14) characterised in that the portable terminal is adapted to interface with an assistive technology device (16) and with a self-service terminal, where the assistive technology device has an interface customised for a particular disability, so that, in use, a user may prepare a transaction using the assistive technology device, transfer the transaction to the self-service terminal using the portable terminal, and execute the prepared transaction at the self-service terminal.



Application No: GB 9916997.1  
Claims searched: 1-10

Examiner: Mike Davis  
Date of search: 9 September 1999

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.Q): G4H (HTG)  
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**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0661676 A1 (AT&T...) eg abstract and Figs.1-3	1-10
X	WO 94/07219 A1 (INTERNATIONAL VERIFACT) eg abstract and Figs.1-3	1-10
X	US 4634845 (HALE ET AL) eg abstract, Figs.1-6, 12,14, column 3, and column 11 lines 12-34	1-10
X	JP 080314687 (NIPPON AVIONICS), and also WPI Abstract Accession No. 97-069477/07 & JAPIO Abstract dated 970331 in volume 097003	1-10

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